

- 1 1. An optical switch device, comprising:  
2 a switch fabric;  
3 a plurality of input ports through which incoming data passes to the switch fabric;  
4 a plurality of output ports through which outgoing data passes from the switch  
5 fabric;  
6 a first demultiplexing device coupled to at least one of the plurality of input ports;  
7 a signal generator coupled to the first demultiplexing device for injecting data into  
8 the switch fabric; and  
9 a first multiplexing device coupled to at least one of the plurality of output ports;  
10 and  
11 a first signal analyzer coupled to the first multiplexing device for analyzing the  
12 data injected by the signal generator.
- 1 2. The device according to claim 1, further including a second signal analyzer  
2 coupled to the first multiplexing switch and a multiplexer coupled between the  
3 first and second analyzers and the first multiplexing device.
- 1 3. The device according to claim 1, further including a second demultiplexing device  
2 coupled to at least one of the plurality of input ports and a second signal analyzer  
3 coupled to the second demultiplexing switch for analyzing data extracted from the  
4 input ports on a polling basis.
- 1 4. The device according to claim 1, wherein the switch fabric includes first and  
2 second switch fabrics.
- 1 5. The device according to claim 1, wherein at least one of the plurality of input  
2 ports includes a splitter for splitting a signal incoming to the at least one input port  
3 into first and second signal, wherein the first signal is received by the first switch  
4 fabric and the second signal is received by the second switch fabric.

- 1 6. The device according to claim 5, wherein at least one of the plurality of output  
2 ports can receive signals from each of the first and second switch fabrics.
- 1 7. The device according to claim 6, further including at least one signal analyzer  
2 coupled to one or more of the plurality of output ports for analyzing data from the  
3 first and second switch fabrics.
- 1 8. The device according to claim 1, further including an add/drop multiplexer  
2 coupled to the switch fabric.
- 1 9. A method for achieving bit level access to data in an optical switch, comprising:  
2 injecting a signal from a first signal generator into a switch fabric via a first  
3 demultiplexing device;  
4 extracting the first signal via a multiplexing switch and analyzing the extracted  
5 first signal.
- 1 10. The method according to claim 9, further including verifying a connection  
2 between an input port of the optical switch and an output port of the optical switch  
3 from the extracted first signal.
- 1 11. An optical communication system, comprising:  
2 a first optical switch having a plurality of input and output ports;  
3 a first optical network coupled to the first optical switch, the first optical network  
4 including a first transponder corresponding to a first termination point for signals  
5 traveling from the first optical network to the first optical switch and a second  
6 transponders corresponding to a second termination point;  
7 a second optical network coupled to the first optical network, the second optical  
8 network including a first transponder corresponding to a first termination point and a  
9 second transponder corresponding to a second termination point; and



9 determining whether the port ID read by the second WDM port matches a port ID  
10 of the first WDM port of the first WDM system; and  
11 continuing to insert the unequipped signal at the first WDM port in the first WDM  
12 system when the port ID matches; and  
13 discontinuing insertion of the unequipped signal when the read port ID does not  
14 match.

1 17. The method according to claim 16, further including receiving the unequipped  
2 signal at an output port of a second optical switch via a signal path through the  
3 output port of the first optical switch, the second port of the first WDM system,  
4 and a second WDM system.

1 18. A method of automatically determining network topology in an optical network  
2 having optical switch, comprising:  
3 coupling first and second optical switches via a WDM system such that a first  
4 input port of the first optical switch is connected to a first output port of the second  
5 optical switch via first and second ports in the WDM system to provide a first signal path  
6 and a first output port of the first optical switch is coupled to a first input port of the  
7 second optical switch via third and fourth ports of the WDM system to provide a second  
8 signal path;  
9 inserting IDs of the first port, the second port, the first optical switch input port,  
10 and the third port into an optical signal in the first signal path;  
11 inserting IDs of the second switch input port, the fourth port, the third port and the  
12 first port into an optical signal in the second signal path; and  
13 identifying a connection between the first optical switch input port and an output  
14 port of the second optical switch and a connection between an output port of the first  
15 optical switch and the input port of the second optical switch based upon a commonality  
16 of the first port and the fourth port in the first and second signal paths.

1 19. The method according to claim 18, further including inserting the second and  
2 third port IDs with a transponder at the second port.

1 20. The method according to claim 18, further including exchanging port ID  
2 information between the first and second optical switches via an out of band  
3 channel.

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